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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Implement the Commission's Procurement Incentive Framework and to Examine the Integration of Greenhouse Gas Emissions Standards into Procurement Policies.	R. 06-04-009

BEFORE THE CALIFORNIA ENERGY COMMISSION

AB 32 Implementation – Greenhouse Gas Emissions.	Docket 07-OIIP-01

COMMENTS OF THE WESTERN POWER TRADING FORUM ON MODELING RELATED ISSUES

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COMMENTS OF THE WESTERN POWER TRADING FORUM ON MODELING RELATED ISSUES

In accordance with the direction provided in the November 9th, 2007 Administrative Law Judge's Ruling under Rulemaking 06-04-009, the Western Power Trading Forum ("WPTF") respectfully submits the following opening comments on the questions raised regarding modeling related issues.

The November 9th ruling establishes several objectives for the greenhouse gas modeling exercise: "The purpose of this project is to produce a tool by which the impact of alternate policy means to achieving emissions reductions within the electricity sector under Assembly Bill (AB) 32 may be quantified. The modeling effort seeks primarily to provide insights about the relative cost-effectiveness of GHG abatement measures available within the electricity sector, as well as the overall cost impacts of achieving GHG targets of varying stringency within the 2020 timeframe. The insights from this modeling effort will also inform ARB's macroeconomic modeling of the broader economic impacts of potential GHG emission reduction measures across all sectors in the California economy. The collective insights gained from the electricity sector

and macroeconomic modeling will position ARB for making better-informed decisions about assigning sector- and entity-level GHG emission reduction obligations."

While the modeling approach used by E3, namely the development of reference case and target scenarios and the GHG calculator, may be used to explore various electricity generation scenarios in the year 2020, WPTF considers that its applicability as a tool for evaluating alternative policy options and overall sectoral costs is limited. The approach is only really designed to evaluate generation mix trade-offs between fossil fuel and renewable generation, solar deployment, energy efficiency, etc. and cost and rate impacts for the largest California utilities. Additional work is necessary to address inherent flaws and improve the usefulness of the model results in informing policy decisions. WPTF has a number of concerns and recommendations in this regard:

- The model results are highly dependent on input assumptions, particularly with respect to renewable and energy efficiency supply curves, which seem overly optimistic. To the extent that these input assumptions are incorrect, the model could underestimate overall costs to the electricity sector and lead to an overestimation of the level of GHG reductions the electric sector can accommodate. All GHG modeling is highly dependent upon energy efficiency and renewable assumptions, and these factors become increasingly relevant the more stringent the program. That is why it is so important to 'get it right' relative to assumptions on efficiency and renewables, i.e., these inputs to the model will directly impact both the reliability of electric supply (in terms of resource adequacy under a stringent cap) and the cost – cost of electricity as well as overall program costs. The Commissions should critically assess the viability of input assumptions used in developing the GHG calculator, particularly the supply curves for

energy efficiency and renewable energy development, and assumptions of transmission availability. E3 should also perform sensitivity analyses of these assumptions.

- We have low confidence in the ability of the modeling approach to evaluate overall system reliability and costs, due to the fact that policy scenarios are developed in the GHG calculator based on static Plexos outputs rather than iterative Plexos runs. The GHG calculator should be better integrated with the Plexos model. Further simulations should be performed by E3, with more enhanced Plexos system representations, and the feasibility of GHG Calculator outputs under the various policy scenarios should be verified through Plexos.
- The model is ill-equipped to fully evaluate alternative GHG policy options, due to the fact that GHG Calculator' assumes a load-based approach. The Plexos model should be run with carbon prices reflected in variable cost dispatch to enable assessment of alternative regulatory approaches, such as a first-seller cap and trade system.
- The modeling approach fails to consider that implementation of GHG policies in other WECC jurisdictions could dramatically reduce the availability of low-cost renewable resources to serve California load. Additional reference cases should be developed to reflect changes in renewable resource availability that could occur due to GHG policies in other WECC jurisdictions, including under a regional cap and trade system such as is being developed under the Western Climate Initiative.

Without these improvements, WPTF believes the model results should not be used to inform decisions about the proportion of GHG reductions that the electric sector should bear relative to other sectors, or decisions regarding specific GHG policies for the electric sector.

More detail on these concerns, as well as responses to the questions raised in the ruling is provided below.

Q1. Does Attachment A cover all of the viable emissions reduction measures available in the electricity and natural gas sectors? If not, what other measures should be considered for the purposes of forecasting emissions reduction potential within these sectors? Please include suggested data sources and references for information regarding any additional measure you purpose.

Attachment A does not address the implementation of a regional cap and trade system, such as that envisaged under the Western Climate Initiative. While a regional cap and trade system is not a potential emission reduction option for California, implementation of such a system could drastically alter resource availability within the WECC, and thus the emission reduction potential of other measures taken under AB32.

Q2. Are there emission reduction measures identified within Attachment A that you believe, based on currently available information, should not be implemented as a means to achieving emission reductions within the context of AB 32? Please justify your answer.

WPTF supports the PUC's broad consideration of potential emission reduction measures within the electricity sector as part of the development of the scoping plan under AB32. However, we wish to emphasize the importance of evaluating the impact of potential emission reduction measures on power system reliability. As discussed in more detail below, we believe that the model's assumptions regarding the cost of integration of renewable energy, particularly wind generation, are overly optimistic and do not adequately consider transmission constraints and the stability of intermittent resources. Further, if demand reductions through energy efficiency and development of new zero-emitting resource do not meet levels assumed in the model, then the opposing constraints of meeting the emissions cap and meeting load requirements cannot both be met. Very optimistic views of energy efficiency and new renewables thus raise real reliability concerns from a resource perspective.

Q3. What means beyond policies currently adopted by the two Commissions hold potential for the delivery of additional energy efficiency?

WPTF does not have specific recommendations on this question.

Q4. What means beyond policies currently adopted by the two Commissions hold potential for the integration of additional renewable resources into the grid?

As stated repeatedly in this and the RPS proceeding, WPTF strongly supports market-based policies for achieving environmental goals. In this regard, WPTF considers that the implementation of a tradable Renewable Energy Credits (REC) system will increase integration of renewable resources into the grid by helping to overcome transmission barriers, which are well-documented in Attachment A. Integration of a REC trading system and a GHG cap and trade system should be fully considered and modeled.

Q5. How might an emissions reduction strategy within the electricity sector be targeted to displace the most carbon intensive aspects of California's electricity resource mix?

As AB32 rightly recognizes, an effective emission reduction strategy for California must address carbon-intensive electricity imports. In this regard, more consideration of the ability of GHG policies to affect environmental dispatch is warranted. Attachment A discusses the results of the 2007 CEC Scenario's Analysis, which suggests that changes in dispatch would reduce GHG emissions at higher carbon prices. While WPTF can not assess whether carbon prices under a California-only GHG cap and trade system would reach the level required to significantly alter dispatch of existing resources, we consider it essential that regulators design a system that has this potential. In the event of regional cap and trade system, the potential emission reductions from environmental dispatch would be higher due to increased demand for (and scarcity of) renewable resources. In focusing solely on such a load-based approach, the

model ignores the potential of alternative trading systems to reduce carbon-intensive imports through environmental dispatch.

Q6. Does E3's modeling documentation adequately document the methodology, inputs, and other assumptions underlying its model? If not, what additional documentation should be added?

While it is clear that much time and effort has gone into the development of the GHG calculator and scenarios, the modeling approach is not fully transparent and would benefit from further description in many areas, for example:

- No specific documentation is provided on the development of the target cases. Rather, the documentation overview provides only a limited description of how resources are added to the two reference scenarios in order to reach target GHG levels. As a result, it is not possible to discern, for example, the difference between E3's "target" case and the Aggressive Policy Reference case, which show comparable levels of GHG emissions.
- It is not clear from the documentation to date how Plexos will be used to confirm the feasibility of the existing, or any future, "target" cases. Plexos appears to have been used to provide a base-line system dispatch and supply curve information to the GHG calculator, which was used in the development of the data and algorithms for the calculator. However, the documentation does not indicate how feasibility (i.e. transmission system or reliability) is assured using this approach, nor is it very specific about the additional work that is intended for phase 2 in this regard.
- The description of the Energy Efficiency supply curves is cryptic and does not provide sufficient information for users to evaluate whether empirical data supports the curves used (this is especially important given the apparent sensitivity of the calculator to assumptions about Energy Efficiency costs).

- While WPTF applauds E3's initiative in developing the GHG Calculator as a hands-on tool for stakeholders, the Calculator needs to be better documented and more user-friendly. For example there is an "input" sheet on the model, yet some inputs are captured on the "main" sheet. Further, there is color coding on the calculator, yet the documentation does not indicate the intent or significance of the color coding. Additional details to describe the organization of the calculator are necessary for it to be a more accurate and credible tool. Finally, discussion of the results of the reference and target case should be improved for consistency with figures in the Calculator.

Q7. Provide feedback, as desired or appropriate, on the structure and approach taken by E3 in its GHG Calculator spreadsheet tool.

The GHG Calculator provides a useful tool to experiment with the costs and carbon benefits of various procurement strategies on large LSEs. However to the extent the modeling platform is used for other objectives, particularly the evaluation of alternative GHG policies and assessment of the overall level of GHG reductions to be achieved by the electricity sector, WPTF has some significant concerns.

- The Calculator does not appear to iterate between input assumptions (reference and target scenarios) and the Plexos simulation. While assumptions are captured in the calculator to help ensure resource expansion plans are feasible (for example from a transmission perspective), no test is made with the dispatch model to ensure that is the case. As a result, the modeling approach does not sufficiently evaluate the impacts of scenarios on system reliability. Further, given that gross assumptions are used about costs of transmission and that no assessment is made of congestion costs within California zones,

it is very likely that renewable additions will create higher system costs than are reflected in the model.

- The model is not a good tool for assessing cost shifts of electric sector market participants, as many market participants are not represented in the disaggregation scheme. Not only does the Calculator not disaggregate to smaller LSEs, but perhaps more notably it was designed to reflect a load-based cap and does not reflect impacts on non-LSE market participants.
- The Calculator is not helpful in assessing any impacts to LSEs of carbon trading or allowance allocation without some sort of extrapolation (e.g., calculating costs based on LSE emissions for those LSEs reflected in the model). For example, the calculator would need to capture the portfolios of a wider range of market participants in order to measure the costs shifts of trading or the cost impacts of the allocation of allowances.
- WPTF is concerned that the modeling approach does not take into consideration potential implementation of other GHG policies with WECC states, such as the regional cap and trade system being developed under the Western Climate Initiative. Imposition of GHG policies by other WECC states has the potential to greatly reduce the quantity of low-carbon generation available to California under AB32. E3's supply curves for renewable energy are based on assumptions about RPS policies and mandates within the WECC, but do not consider how these might change in the event of regional GHG policies. This is particularly worrisome in light of the PUC's assertion in attachment A to the ruling that "A number of resource assessments confirm renewable resource availability on the order of what would be required to achieve renewable penetrations upwards of 30 percent." For this reason, WPTF urges that the modeling approach explicitly consider the potential

for a regional cap and trade system, not as specific policy option for California, but as a reference case.

- Because the GHG calculator was developed to model a load-based approach, it cannot as currently configured quantify the benefit of alternative GHG trading systems, such as source-based or first-seller carbon trading system (regional or CA-only). For this reason, the GHG Calculator can not quantify the potential emission reductions and costs of environmental dispatch – which would be particularly important under a regional cap and trade system. WPTF recommends that E3 also conduct scenarios incorporating Plexos run where GHG variable costs are considered in system dispatch under both a California-only and regional GHG programs.

Q8. Provide feedback, as desired or appropriate, on the data sources used by E3 for its assumptions in its issue papers. If you prefer different assumptions or sources, provide appropriate citations and explain the reason for your preference.

Whereas E3 seems to have made best efforts to develop appropriate cost and supply curves for renewable resources, the Calculator includes some rather gross assumptions regarding transmission constraints and firming resources. For instance, the Calculator assumes that 10% of the transmission system capacity is available for energy generated from wind resources, and of course this is an oversimplification regardless of whether it is correct on average. Further, the Calculator also makes assumptions about costs and effectiveness of energy efficiency measures. Given that the model results are highly dependent on these inputs, particularly energy efficiency, all of these assumptions have the potential to mischaracterize costs and impacts of various carbon reduction strategies for the electricity sector.

With respect to assumptions regarding incremental renewable generation, WPTF considers that these can be best tested by using Plexos in a nodal configuration. Proper data to assess impacts of more wind, namely information about transmission constraints and firming resources, is employed within Plexos. Running Plexos in a nodal configuration would test feasibility and properly calculate systems costs, including any necessary redispatch costs, rather than simply relying on the transmission system assumptions described in the E3 documentation.

WPTF cautions the Commissioners against relying on overly-optimistic assumptions about energy efficiency in evaluating cost and reliability impacts of GHG caps. E3 itself caveats its assumptions regarding energy efficiency supply curves heavily, particularly with respect to estimates at 'high-end levels."[1] Without further information about the studies that led to the assumptions that produced the energy efficiency supply curves, it is difficult to conclusively state whether or not the assumptions are appropriate. However, as indicated in our response to Question 6, the results of the model seem very sensitive to the supply curve for energy efficiency. Therefore, WPTF recommends that the E3 conduct analyses of the sensitivity of model results to assumptions regarding energy efficiency and provide this information for stakeholder consideration.

Q9. Are uncertainties inherent in the resource potential and cost estimates adequately identified? Does E3's model provide enough flexibility to test alternative assumptions with respect to these uncertainties?

E3 has clearly detailed the assumptions in most areas, other than those already indicated in our comments. As a result, uncertainties are fairly clearly implied. However, the GHG

[1] In its discussion of the energy efficiency methodology, E3 noted that "less research has been put into the development of the "high-end" of the energy efficiency supply curve, namely the measures and technologies which are not currently considered to be economic or effective. However, some of the very high energy efficiency policy scenarios begin to rely on this higher end of the supply curve, where actual costs are less reliable."

calculator does not have "levers" (e.g., selectable inputs on the "main" or "input" sheets) for users to modify many assumptions about resource potential and resource costs. This is especially true in the area of renewable development, where E3 has already developed composite supply curves based upon relative costs and resource potential assumptions. While it may be possible to adjust all but the Plexos inputs in the GHG calculator, the calculator does easily support adjustment of these attributes and uncertainties by a user.

Q10. Has the E3 model adequately accounted for the implications of increased reliance on preferred resources (renewables, efficiency) on system costs?

See responses to questions 6, 7 and 8.

Q11. Should E3's model, in Stage 2, attempt to model potential market transformation scenarios, in the form of cost decreases, new technologies, or behavioral changes? What might be an appropriate way to characterize such potential for market transformation?

There would seem to be no defendable way to model deployment of new technologies and we are not aware of any dynamic or behavioral effects at this time.

Q12. What specific flexible GHG emission reduction mechanisms to mitigate the economic impacts of achieving the desired GHG emission reductions should be modeled in Stage 2?

It is not clear to us that the Calculator is helpful in its current configuration in assessing impacts of carbon trading, allowance allocation or other flexible mechanisms (such as banking and borrowing) without additional extrapolation (e.g., calculating costs based on LSE emissions for those LSEs reflected in the model).

To the extent that the modeling approach is expanded in-line with WPTF's recommendations, then we believe it would be useful to model the full range of flexible mechanisms. Specifically, we recommend modeling alternative cap and trade options (e.g. first-

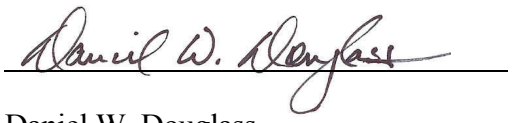
seller), alternative allowance allocation schemes, multi-year compliance periods, and banking and borrowing.

Q13. What output metric or metrics should be utilized to evaluate the least cost way to meet a 2020 emission reduction target for the sector?

In addition to the cost per ton reduction on CO2, other metrics would also be useful, including the total cost to serve load across the California participants, and rate impacts to a broader set of market participants (e.g., other LSEs and other potentially regulated entities).

WPTF appreciates this opportunity to comment and the Commission's consideration of the discussion provided herein.

Respectfully submitted,



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January 4, 2008

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the Comments of the Western Power Trading Forum on Modeling Related Issues on all parties of record in R.06-04-009 by serving an electronic copy on their email addresses of record and by mailing a properly addressed copy by first-class mail with postage prepaid to each party for whom an email address is not available.

Executed on January 4, 2008, at Woodland Hills, California.

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